

## Title - Clinico-pathological study of Acute Appendicitis with Special Reference to Modified Alvarado Scoring System and Post Operative Histopathological Examination from Northwestern Bihar: A Prospective Study

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### Abstract

**Background:** Appendicitis is anticipated to affect about 6% of the population at some point in their lives. The reduced prevalence of acute appendicitis in Asian and African nations is likely due to the dietary patterns of these populations. **Objectives:** To compare the diagnosis of acute appendicitis by Alvarado score to that by histopathological examination as well as to determine whether there is any correlation between dietary intake pattern and the occurrence of acute appendicitis. **Methodology:** It was a prospective cohort study involving 148 participants attending surgery OPD between 08 months from June 2021 to January 2022. Detailed history and clinical examination was done followed by admission and laboratory investigations. Confirmation of diagnosis was done based on modified Alvarado scoring system and ultrasonography. **Results:** After analysis of 148 study participants, it was found that 88% of them belong to age group of >18 upto 40 years and 63% of them were males. No significant association was found between diet and appendicitis. **Conclusion:** Both Modified Alvarado Scoring System (MASS) and histopathological examination was found to be diagnostic for appendicitis.

**Keywords:** Acute Appendicitis, Modified Alvarado Scoring System, Histopathology

### Introduction:

The "worm of the intestines," or vermiform appendix, which most people regard to be a vestigial organ, can occasionally be a genuine annoyance if it is the source of an infection that causes appendicitis. (1) Acute appendicitis is the most typical cause of acute abdominal pain, although it can be challenging to diagnose, especially in the early stages of the condition. (2) In routine surgical practise, it is a more frequent surgical emergency. (3) Appendicitis is anticipated to affect about 6% of the population at some point in their live. (4) The reduced prevalence of acute appendicitis in Asian and African nations is likely due to

the dietary patterns of these populations. Dietary fibre is supposed to reduce the viscosity of faeces, speed up bowel transit, and prevent the development of faecolith, which puts people at risk for appendiceal lumen blockages. (5) Postponement in diagnosis raise treatment costs, morbidity, and mortality.(6)Acute appendicitis has always been considered to be diagnosed clinically. (7) A detailed history and physical examination of the patient is very crucial for accurate diagnosis. (7) Various scoring systems have been developed for assisting the diagnosis of acute appendicitis. (7) One of these is the Alvarado scoring system, which is just dependent on a patient's history, clinical examination, and a few laboratory tests. It is also relatively simple to use.(8) however, the definitive diagnosis can only be made by histopathological examination of the dissected specimen after surgery to overcome the Difficulties in diagnosis in very young, elderly patients, and females of reproductive age due to their higher likelihood of having an atypical presentation, and because many other conditions may mimic acute appendicitis in these patients.(9) It results in a false diagnosis and an unsuccessful appendectomy. Alvarado scoring system has been adopted to avoid this unfavourable appendicectomy.

Currently, the modified Alvarado score is used to diagnose acute appendicitis. The patient's history, the physical examination, and laboratory testing are all taken into account when calculating the score. The following are the parameters: 1. Right iliac fossa pain spreading from the abdomen. 2. Ketone bodies in the urine or anorexia 3. Vomiting or nauseous 4. Right iliac fossa tenderness 5. Tenderness on rebound 6. Fever of at least 37.3 degrees Celsius 7. More than 10,000 cells per microliter of serum indicate leukocytosis. White blood cell count in serum with neutrophilia(8) The most accurate and gold standard test for diagnosing acute appendicitis is histo pathological examination post-surgery.

This study was conducted to compare the diagnosis of acute appendicitis by Alvarado score to that by histopathological examination as well as to determine whether there is any association between dietary intake pattern and the occurrence of acute appendicitis. Several literatures have described the role of histopathological examination in diagnosing acute appendectomy, but none have compared the diagnosis by Alvarado score versus histopathological examination.

**Methodology:****Study Design:**

Prospective cohort study

**Study Setting and sample size:**

The current study was carried out in a tertiary care hospital of northwestern part of Bihar among 148 study participants selected by total consecutive sampling technique.

**Study duration:**

08 months from June 2021 to January 2022.

**Subject and Methods:**

All the patients who attended the surgery OPD with the complaints of acute abdomen were recruited for the study and adult patients above the age of 18 years, having pain in right iliac fossa, suspected of having appendicitis and giving informed written consent to participate in the study were included in the study. Detailed history and clinical examination was done followed by admission and laboratory investigations. Confirmation of diagnosis was done based on modified Alvarado scoring system and ultrasonography. The scores of modified Alvarado score were interpreted as follows: 1-4: very unlikely chances of appendicitis, 5-7: most probably it is acute appendicitis and > 7: definite diagnosis of acute appendicitis. The patients with confirmed diagnosis of acute appendicitis were subjected to appendicectomy

and further histopathological examination of the dissected appendix was done. Clinical diagnosis made by MASS was compared with the diagnosis obtained by histopathological examination. Patients with other causes of acute abdomen and those with acute appendicitis who refused surgery were excluded from the study.

#### Data Entry and analysis:

Templates were generated in MS Excel sheet to fill the collected data and analysis of data was done using SPSS software version 20.

**Ethical clearance:** The study was approved by the ethics committee of the institution.

**Results:** After analysis of 148 study participants, it was found that 88% of them belong to age group of >18 upto 40 years and 63% of them were males as depicted in table 1.

**Table 1: Demographic details of the study participants (n = 148)**

S. No.	Variable	Frequency	Percentage	
1	Age group	>18 upto 40 years	130	88%
		>40 upto 60 years	13	9%
		>60 years	5	3%
2	Gender	Male	93	63%
		Female	55	37%
3	Occupation	Service	87	59.1%
		Self Employed	36	24.1%
		Others	25	16.8%
4	Dietary pattern	Vegetarian	22	15.2%
		Mixed Indian	126	84.8%

**Table 2: Distribution of study participants according to grading of MASS (n = 148)**

S. No.	MASS Score	Male	Female
1	1 - 4	16	6
2	5 - 7	38	31
3	>7	39	18
Total		93	55

**Table 3: Gender wise Histopathological findings of specimen (n = 148)**

S. No	HPE findings	Male	Female
1	Inflamed appendix	74	41
2	Gangrenous appendix	8	4
3	Normal appendix	11	10
Total		93	55

The comparison of MASS scores along with histopathological findings has been depicted in table 4.

**Table 4: Comparison of MASS findings with HPE findings (n = 148)**

MASS Scores	Histopathological examination findings			Total
	Inflamed appendix	Gangrenous appendix	Normal appendix	
1 - 4	11	5	6	22

5 – 7	50	6	13	69
>7	54	1	2	57
Total	115	12	21	148

**Table 5: Association of Dietary pattern with occurrence of appendicitis (n = 148)**

Dietary Pattern	Appendicitis		$\chi^2 = 0.763$ df = 2 p = 0.847
	YES	NO	
Vegetarian	15	7	
Mixed Indian	112	14	
Total	127	21	

**Discussion**

The proposed study of Acute Appendicitis with special reference to Modified Alvarado Scoring System (MASS) and post operative histo-pathological examination from northwestern Bihar: A Prospective Study was done to compare the diagnosis of acute appendicitis by Alvarado score to that by histopathological examination as well as to determine whether there is any correlation between dietary intake pattern and the occurrence of acute appendicitis. As per RajaShekar Jade's research, patients of both sexes with ages ranging from six to fifty and older were involved in the study. All patients were given a pre-operatively modified Alvarado score, and the findings were assessed against surgical and histological diagnosis reports. Modified Alvarado scores between 1-4, 5-7, and 8-10 in our study exhibited accuracy rates of 10%, 75%, and 100%, respectively. The accuracy increased as the score increased. Patients with lower scores should be monitored. Male patients had higher score sensitivity than female patients, on average. (7). In another study by Gupta A 200 out of the 2600 patients that were investigated for this study and had appendicitis. The prevalence was 7.6%. There were 70 women and 130 men. Males had a mean age of 42.17+/-3.14 years and females had a mean age group of 33.18+/-9.38 years. Pyrexia was seen in 53% of patients. Rebound tenderness was present in 42% of patients. 17% of the cases involved guards. (10) A study by Emmanuel S. Kanumba revealed that 127 patients in total were looked at. Their ages (mean 29.64 12.97) varied from eight to 76 years. There were 90 females (70.9%) and 37 males (29.1%; M: F = 1:2.4). Appendectomy was performed on every patient in this study. The rate of perforation was 9.4%. 85 patients (66.9%) had appendicitis verified by histopathological analysis, while 42 patients had normal appendices, providing a negative appendectomy rate of 33.1% (26.8% for men and 38.3% for women). In this study, MASS's sensitivity and specificity were 94.1% (94.8% for men and 88.3% for women) and 90.4% (92.9% for men and 89.7% for women), respectively. The Positive Predictive Value was 95.2% (men 95.5%, women 90.6%), and the Negative Predictive Value was 88.4% (men 89.3%, women 80.1%). MASS had a 92.9% accuracy rate (males 91.5%, females 87.6%). (9). Using a cutoff score of six or higher, Ricardo Reis do Nascimento discovered a statistically significant (p=0.002) correlation between the Alvarado score and the diagnostic confirmation, with a sensitivity of 72% and a specificity of 87.5%. When compared to a score less than six, a score greater than or equal to six demonstrated a larger tendency to present more advanced stages of acute appendicitis in both surgical and histological results. Comparing males and females, problems were more likely in men (p=0.003).(11)

## Conclusion

It was concluded from the study that both Alvarado score and histopathological examination are diagnostic for acute appendicitis. As far as diet is concerned, it has no significant association with appendicitis.

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